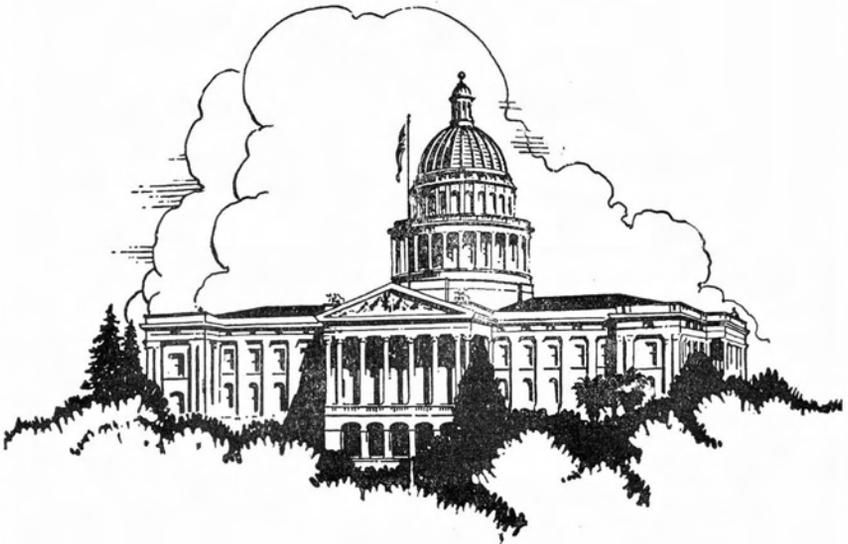


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## ERIOPHYID STUDIES VIII

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**E**RIOPHYID Studies VII appeared in the Monthly Bulletin, Vol. 28, p. 484, November 17, 1939. The present installment contains descriptions and illustrations of 22 additional species. This brings the total to 132 figured species, of which 116 have been described as new.

A number of queries have been received concerning the mounting of mites. The mites on which these studies are based have been mounted in a form of Berlese fluid. The various forms of this medium are well known and an enlightening account of Berlese fluid and its application is given by Imms. *Bul. Ent. Res.* Vol. 20, p. 166, 1929. The reader is referred to this article.

The formula upon which I have based my work was published by Stewart and Freeborn, *U. C. Agr. Exp. Sta. Bul.* 603, p. 6, January, 1937.

H <sub>2</sub> O	10-12 cc
Chloral Hydrate	53-55 gr
Gum Arabic	8 gr
Glycerin	6 cc
Iodin crystals	small amount

This is most easily made by obtaining the best grade of powdered gum. The chloral crystals are then crushed in a mortar with the gum arabic powder. This mixture is added to the water in a permanent container and allowed to dissolve for several days, with occasional stirring. Gum arabic powder, if placed alone in water, tends to form insoluble lumps. After solution is well under way add the glycerin.

Iodin, which is the staining element, can be put in the dry mixture or in the final solution. It dissolves slowly.

The mites are "needled" over into a drop of this medium on a slide, the coverslip is placed, and the mount is discretely warmed. Unfortunately, this medium leaves much to be desired.

Mites transferred from this medium to resinous media, shrivel up and become worthless for recognition purposes. Alcoholic mites shrivel in this chloral hydrate medium.

### *Eriophyes triradiatus* Nalepa

#### Plate 114

- Nalepa—*Anz. Ak. Wiss. Wien.* Vol. 29, p. 128, 1892  
 Nalepa—*Denk. Ak. Wiss. Wien.* Vol. 68, p. 214, 1900  
 Nalepa—*Zoologica*, Vol. 24, p. 221, 1911  
 Nalepa—*Marcellia*, Vol. 25, p. 74, 1929

Female about 150  $\mu$  long, 40  $\mu$  thick, wormlike, light yellow to amber. Rostrum 23  $\mu$  long, curved down. Shield 26  $\mu$  long, 30  $\mu$  wide, rounded in front, median, admedian and one or two submedian lines distinct, rest of shield with sides granular; dorsal tubercles 16.5  $\mu$  apart, a little ahead of rear margin; dorsal setae 15  $\mu$  long, projecting forward. Forelegs 26.5  $\mu$  long, tibia 5.5  $\mu$  long, tarsus 6.5  $\mu$  long, claw 6  $\mu$  long, slightly knobbed, featherclaw 3 rayed. Hindlegs 25  $\mu$  long, tibia 4  $\mu$  long,

tarsus 6  $\mu$  long, claw 8  $\mu$  long. Sternal line simple, coxae granular. Abdomen with about 60 rings, completely microtuberculate, or with last few tergites smooth. Lateral seta 17.5  $\mu$  long, on about ring 6; first ventral 50  $\mu$  long, on about ring 18; second ventral 10  $\mu$  long, on about ring 33; third ventral 18  $\mu$  long, on about ring 5 from rear; accessory seta present. Female genitalia granular anteriorly, 17  $\mu$  wide, 10.5  $\mu$  long, coverflap with 9-10 ridges, seta 12  $\mu$  long.  
Male 140  $\mu$  long, 35  $\mu$  thick.

**Locality**, Sacramento, California. **Collected** August 17 and October 13, 1939, by the writer. **Host**, *Salix hindsiana* Benth. **Relation to host**: The mites are very numerous among the terminal leaves close to the bud. No damage has been noted.

The individuals taken here near Sacramento seem to be nothing more than Nalepa's species as described in Europe. This would then indicate the mite to have a holarctic range. The combination of forward directed shield setae with a 3-rayed featherclaw is unusual.

### *Eriophyes neoessigi* Keifer, new species

#### Plate 115

Female 170-200  $\mu$  long, 30-40  $\mu$  thick, wormlike, yellowish. Rostrum 33  $\mu$  long, curved down. Shield 34  $\mu$  long, 31  $\mu$  wide, elongate centrally, median, admedian and two submedian lines present, the sides beyond the lines heavily granular; dorsal tubercles 23.5  $\mu$  apart, on rear margin; dorsal setae 25  $\mu$  long, projecting backward. Forelegs 30  $\mu$  long, tibia 7.5  $\mu$  long, tarsus 6  $\mu$  long, claw 7  $\mu$  long, featherclaw 6 rayed. Hindlegs 27.5  $\mu$  long, tibia 6  $\mu$  long, tarsus 5.5  $\mu$  long, claw 8  $\mu$  long. Coxae heavily granular, sternal line long and forked. Abdomen with 70-80 rings, entirely microtuberculate. Lateral seta 20  $\mu$  long, on about ring 7; first ventral 65  $\mu$  long, on about ring 22; second ventral 11.5  $\mu$  long, on about ring 44; third ventral 21  $\mu$  long, on about ring 6 from rear; accessory seta present. Female genitalia 17  $\mu$  wide, 11.5  $\mu$  long, coverflap with about 10 ridges, seta 14.5  $\mu$  long.  
Male not seen.

**Type locality**: Jensen, Utah. **Collected** May 5, 1939, by K. Hix. **Host**: *Populus* sp. **Relation to host**: The mites cause a peculiar and characteristic modification of what appears to be the female catkin. Each capsule is modified into a diamond-shaped gall which is long-stalked flattened and wrinkled. **Type slide**: With the above data. **Paratype slides**, six in number, as above. *Eriophyes neoessigi* is perhaps most similar to *dispar* Nalepa, but differs in being larger, in having a different shield pattern and having a 6-rayed featherclaw. *Eriophyes dispar* possesses a 5-rayed featherclaw. I take pleasure in naming this mite for Prof. E. O. Essig who sent me the material.

### *Eriophyes parapopuli* Keifer, new species

#### Plate 116

Female 180  $\mu$  long, 55  $\mu$  thick, reddish, spindleform. Rostrum 27.5  $\mu$  long, projecting ahead and down. Shield 29  $\mu$  long, 42  $\mu$  wide, nearly smooth, a faint central indication of a network design, a few lateral tubercles; dorsal tubercles 26  $\mu$  apart, on rear margin; dorsal setae 38  $\mu$  long, projecting backwards. Forelegs 30  $\mu$  long, tibia 7.75  $\mu$  long, tarsus 8  $\mu$  long, claw 7.5  $\mu$  long, slightly knobbed, featherclaw 4 rayed. Hindlegs 28  $\mu$  long, tibia 6  $\mu$  long, tarsus 7.5  $\mu$  long, claw 9  $\mu$  long. Sternal line simple. Abdomen with 48-54 rings, microtuberculate except the last 10 to 12 tergites which are smooth. Lateral seta 23  $\mu$  long, on about ring 5; first ventral 61  $\mu$  long, on about ring 15; second ventral 15  $\mu$  long, on about ring 27; third ventral 23  $\mu$  long, on about ring 4 from rear; accessory seta present. Female genitalia 21.5  $\mu$  wide, 10.5  $\mu$  long, coverflap smooth, seta 21  $\mu$  long.  
Male 170  $\mu$  long, 50  $\mu$  thick.

**Type locality**: Ennis, Montana. **Collected** January 2, 1939, by Eric P. White. **Host**: *Populus* sp. "Canadian Poplar." **Relation to host**: The mites cause a proliferation around the buds, forming irregular woody galls sometimes a half inch or more in diameter.

**Type slide**, with the above data, and bearing U. S. Bureau of Entomology No. 39-327. **Paratype slides**, six in number, as above. The type slide is the property of the U. S. Bureau. The host is called "Canadian Poplar" locally but is not *P. balsamifera* and is thought to be a hybrid. *Eriophyes parapopuli* is very similar to *populi* Nalepa, differing only in the pattern of the shield and the possession of accessory setae. It may well be that *parapopuli* will eventually be considered as a variety of *populi*, since they both cause the same damage. This species was transmitted to me by Dr. C. F. W. Muesebeck, who received it from F. P. Keen.

Another collection of this same mite damaging "Cottonwood" at Powell, Wyoming, June 20, 1939, has been received under U. S. Bureau No. 39-10283.

### **Eriophyes amicus** Keifer, new species

#### Plate 117

Female 195-210  $\mu$  long, 45  $\mu$  thick, wormlike, reddish? Rostrum 23  $\mu$  long, projecting forward and down. Shield 31  $\mu$  long, 32  $\mu$  wide, design obscure, median and admedian lines distinguished to rear, admedian divergent caudally, a lateral lobe followed by some spinulate tubercles; dorsal tubercles 20.5  $\mu$  apart, on rear margin; dorsal setae 15  $\mu$  long, projecting caudad. Forelegs 31  $\mu$  long, tibia 6  $\mu$  long, tarsus 9  $\mu$  long, claw 9.5  $\mu$  long, tapering, slightly recurved, featherclaw 3 rayed. Hindlegs 28  $\mu$  long, tibia 4.5  $\mu$  long, tarsus 8.5  $\mu$  long, claw 9.5  $\mu$  long. Sternal line long, forked. Abdomen with 50-60 rings, some ventrad reduction; the rings entirely microtuberculate and each tubercle bearing a spinule. Lateral seta 25  $\mu$  long, on about ring 6; first ventral 31  $\mu$  long, on about ring 18; second ventral 20  $\mu$  long, on about ring 32; third ventral 18  $\mu$  long, on about ring 5 from rear; accessory seta present, moderate size. Female genitalia in ventral view broad lenticular with large anterior lobe, 20.5  $\mu$  wide, 13  $\mu$  long, coverflap smooth, seta 11  $\mu$  long.

Male not studied.

**Type locality**: Wheeler Canyon, Santa Paula district, California. **Collected**, October 4, 1939, by Cyril Gammon. **Host**: *Juglans californica* Wats., Southern California Black Walnut. **Relation to host**: The mites are inquilin in the leaf galls of *Eriophyes brachytarsus* K. **Type slide**, with the above data. **Paratype slides**, three with the above data. Two paratype slides of mites from Davis, Cal., host *Juglans hindsii* Jep., October 10, 1939, collected by the writer. This mite is definitely a member of the Juglandaceous type of *Eriophyes* but is quite distinct in possessing the spiniferous tubercles. It is not nearly as numerous as the gall former (*brachytarsus*) and its color has not been determined. It has only been distinguished after the mites have been placed on the slides.

### **Eriophyes cinerea** Keifer, new species

#### Plate 118

Female 140-240  $\mu$  long (average 180), 35-40  $\mu$  thick, light yellowish, wormlike. Rostrum 19.5  $\mu$  long, projecting forward and curved down. Shield 23.5  $\mu$  long, 26  $\mu$  wide, smooth; dorsal tubercles 17.5  $\mu$  apart, on rear margin; dorsal setae 14  $\mu$  long, projecting backward. Forelegs 26.5  $\mu$  long, tibia 4  $\mu$  long, tarsus 6.5  $\mu$  long, claw 8  $\mu$  long. Hindlegs 23.5  $\mu$  long, tibia 4  $\mu$  long, tarsus 6  $\mu$  long, claw 7.5  $\mu$  long. Sternal line long, obscurely forked. Abdomen with 53-61 rings, entirely microtuberculate except last 6 or 7 tergites; rings 3.65  $\mu$  broad; microtubercles rather broad, rounded or subtriangular, 3 to 4 tubercles to 6  $\mu$ . Lateral seta 11  $\mu$  long, on about ring 4; first ventral 9  $\mu$  long, on about ring 14; second ventral 9  $\mu$  long, on about ring 29; third ventral 17  $\mu$  long, on about ring 4-5 from rear; accessory seta present. Female genitalia 15.5  $\mu$  wide, 8.5  $\mu$  long, coverflap smooth, seta 5.5  $\mu$  long, on 4.5  $\mu$  spurs.

Male not seen.

**Type locality**: Conewango, New York. **Collected** August 4, 1939. **Host**: *Juglans cinerea* L., Butternut. **Relation to host**: The mites

cause extensive undersurface erineum on the leaves. **Type slide**, so designated, with the above data, the property of the U. S. Bureau of Entomology. **Paratype slides**, six in number, as above. These slides bear U. S. No. 39-12283. This mite is very similar to *Eriophyes erineus* Nal., and may eventually be considered as a variety of that species. It is a little larger, with the shield practically lacking markings, the rings are wider, the microtubercles are bigger and less elongate, there are more posterior smooth tergites, and the female genital setal lobes are more attenuate.

### *Eriophyes caulis* Cook

Plate 119

Cook, Rep. Indiana Geol. Vol. 29, p. 859, 1904  
Felt, N. Y. State Mus. Bul. 200, p. 41, 1918, as *Eriophyes* sp.  
Nalepa, Marcellia Vol. 25, p. 74, 1929

Female 150-210  $\mu$  long, 30  $\mu$  thick, wormlike, reddish. Rostrum 17.5  $\mu$  long, projecting forward and down. Shield 21  $\mu$  long, 23  $\mu$  wide, median and admedian lines faint, incomplete, prominent lateral lobes; dorsal tubercles 14.5  $\mu$  apart, on rear margin; dorsal setae 13  $\mu$  long, projecting backward. Forelegs 23.5  $\mu$  long, tibia 4.5  $\mu$  long, tarsus 7  $\mu$  long, claw 7.5  $\mu$  long, tapering, featherclaw 3 rayed. Hindlegs 20.5  $\mu$  long, tibia 3  $\mu$  long, tarsus 6.5  $\mu$  long, claw 7.5  $\mu$  long. Sternal line strong, slightly forked. Abdomen with 60-70 rings, entirely microtuberculate, the rings about 2.5  $\mu$  broad with 3 to 5 microtubercles to 6  $\mu$ . Lateral seta 10  $\mu$  long, on about ring 5; first ventral 10.5  $\mu$  long, on about ring 18; second ventral 7.5  $\mu$  long, on about ring 34; third ventral 16  $\mu$  long, on about ring 5 from rear; accessory seta present. Female genitalia 15  $\mu$  wide, 10  $\mu$  long, coverflap with two transverse curved lines near rear margin; seta 4.5  $\mu$  long.

Male not seen.

**Localities:** Nutley, N. J., and Morristown, Pa. **Collected:** July 1939, August 29, 1939, and August 1939. **Host:** *Juglans nigra* L., Black walnut. **Relation to host:** The mites produce a peculiar erineum-covered swelling of the petioles. The specimens figured are from the August 29 collection at Nutley. The two collections bear U. S. Bureau Nos. 39-10827 and 39-13206 respectively. The August 29 collection was obtained via Dr. C. F. W. Muesebeck through the kindness of B. A. Porter. Strangely enough this mite, which causes a peculiar type of petiole erineum, is hard to separate from *brachytarsus* K., the leaf-gall mite of western black walnut. It is easily discernible that the two are different things, but the separation is so comparative as to be hard to define. The two species can be tabulated thus:

	<i>caulis</i>	<i>brachytarsus</i>
Length, female	150-210 $\mu$	210-240 $\mu$
Width	30 $\mu$	42-45 $\mu$
Length, foreleg	23 $\mu$	30-35 $\mu$
tibia	4.5 $\mu$	4.5-5.75 $\mu$
tarsus	7-7.5 $\mu$	9.5-10.5 $\mu$
Width, rings	2.5 $\mu$	4-4.5 $\mu$
Tubercles	3 to 5 in 6 $\mu$	2½ to 3 in 6 $\mu$
	Strong lateral shield lobes	Weak lateral shield lobes
	Abdomen entirely tuberculate	Posterior tergites tending to lack tubercles

The species *brachytarsus* was described from *Juglans hindsii* in Sacramento. The mites from *Juglans californica* at Santa Paula in Southern California are on the average smaller and with a more definite tendency toward posterior tubercle suppression. However, intergradations seem to preclude the possibility of defining a variety.

The mite on English walnut causing leaf erineum, namely *erineus* Nalepa, has been listed as a subspecies of *tristriatus* Nalepa. *Eriophyes tristriatus* is said to have a much longer tarsus. Further, *tristriatus*

should be examined for the presence or absence of the female genital setal lobes, a very unusual structure found on part of the Juglandaceous mites. Nalepa's figure of *tristriatus* does not show these lobes. In the writer's opinion *erineus* should be considered a valid species.

Through the cooperation of Dr. C. F. W. Muesebeck of the U. S. Bureau of Entomology, it is now possible to present a synopsis of all of the described Juglandaceous mites found in the United States. There are six of these species, all of which have been figured in these articles. These mites as a group are different from all others seen, but do not bear characters that at present seem to allow a generic segregation. They are characterized by: 3-rayed featherclaws, stocky legs with rounded joints, small shield, cylindrical wormlike body, large blunt caudum, short setae and smooth female genital coverflap. They are divided into two groups by the female genital setiferous tubercles as follows:

- |   |                            |
|---|----------------------------|
| 1. Female genital setae on spur-like lobes.....   | 2                          |
| 1. Female genital setae on normal tubercles.....  | 4                          |
| 2. Abdominal rings very obscurely microtuberculate; leaf edgeroll on <i>Carya pecan</i> .....   | <i>caryae</i> Keifer       |
| 2. Abdominal rings very strongly microtuberculate.....  | 3                          |
| 3. Shield pattern entirely obscure, last 6 or 7 tergites more or less smooth, lobes bearing genital setae longer and narrower; leaf erineum on <i>Juglans cinerea</i> .....   | <i>cinerea</i> n. sp.      |
| 3. Admedian shield lines distinguishable near dorsal tubercles, last 3 or 4 tergites smooth or nearly so, lobes with genital setae shorter and broader; leaf erineum on <i>Juglans regia</i> .....                                    | <i>erineus</i> Nal.        |
| 4. Microtubercles spiniferous; inquilin in leaf galls of <i>E. brachytarsus</i> , on <i>Juglans californica</i> and <i>hindsii</i> .....  | <i>amiculus</i> n. sp.     |
| 4. Microtubercles rounded.....  | 5                          |
| 5. Form somewhat thinner with smaller parts and shorter setae; forelegs 23 $\mu$ long, the tibia more than $\frac{1}{2}$ the length of the tarsus; causing erineum covered petiole swelling on petioles of <i>Juglans nigra</i> ..... | <i>caulis</i> Cook         |
| 5. Form larger and stouter with larger parts and longer setae; forelegs 32-35 $\mu$ long, the tibia about $\frac{1}{2}$ tarsal length; causing bag galls on leaves of <i>Juglans californica</i> and <i>hindsii</i> .....             | <i>brachytarsus</i> Keifer |

### *Eriophyes abalis* Keifer, new species

#### Plate 120

Female 260  $\mu$  long, 60  $\mu$  thick, wormlike, robust, creamy-yellow. Rostrum 26  $\mu$  long, curving downward. Shield 29  $\mu$  long, 32  $\mu$  wide, median, admedian and submedian lines present; sides set with short diagonal dashes followed by granules; dorsal tubercles 23  $\mu$  apart, on rear margin; dorsal setae 53  $\mu$  long, projecting backward. Forelegs 29.5  $\mu$  long, tibia 6.5  $\mu$  long, tarsus 8  $\mu$  long, claw 9  $\mu$  long, tapering, featherclaw 5 rayed. Hindlegs 28  $\mu$  long, tibia 5  $\mu$  long, tarsus 7.5  $\mu$  long, claw 10  $\mu$  long. Sternal line forked. Abdomen with about 75 rings, entirely microtuberculate, the tubercles each with a short spinule. Lateral seta 25  $\mu$  long, on about ring 10; first ventral 54  $\mu$  long, on about ring 23; second ventral 20.5  $\mu$  long, on about ring 40; third ventral 26  $\mu$  long, on about ring 6 from rear; accessory seta present. Female genitalia 21  $\mu$  wide, 15  $\mu$  long, coverflap with 10-12 ridges, seta 18  $\mu$  long.

Male not seen.

**Type locality:** Sacramento, California. **Collected** October 19, 20, and 26, 1939, by the writer. **Host:** *Artemisia heterophylla* Nutt. **Relation to host:** The mites cause hairy pockets on the undersides of the leaves. In severe cases the terminal leaves of the plant may be deformed. **Type slide,** so designated, with the above data, dated October 26. **Paratype slides,** three in number, as above. This mite is similar to *Eriophyes artemisiae* Can. of Europe, but seems to have a different shield pattern and has 5-rayed featherclaws. This mite was originally confused by the writer with *neoartemisiae* K., a mite on the same host that lives among the normal hairs. This latter species has 4-rayed featherclaws.

**Eriophyes larreae** Keifer, new species

## Plate 121

Female 120-140  $\mu$  long, 40  $\mu$  thick, rather short spindleform, light yellowish. Rostrum 40  $\mu$  long, curved down, large. Shield 26  $\mu$  long, 37  $\mu$  wide, median line present to rear, admedians complete, submedian curved; lateral granular band; dorsal tubercles 26  $\mu$  apart, on rear margin; dorsal setae 25  $\mu$  long, projecting backwards. Forelegs 30  $\mu$  long, tibia 7  $\mu$  long, tarsus 7.5  $\mu$  long, claw 7  $\mu$  long, tapering, featherclaw 3 rayed. Hindlegs 26  $\mu$  long, tibia 5.5  $\mu$  long, tarsus 7  $\mu$  long, claw 7.5  $\mu$  long. Sternal line simple. Abdomen with 48-55 rings, some ventrad reduction in ring number, microtubercles bearing a spine. Lateral seta 27  $\mu$  long, on about ring 7; first ventral 50  $\mu$  long, on about ring 17; second ventral 9.5  $\mu$  long, on about ring 30; third ventral 20  $\mu$  long, on about ring 5 from rear; accessory seta present. Female genitalia 21.5  $\mu$  wide, 14.5  $\mu$  long, cover flap with 12-14 ridges, seta 33  $\mu$  long.

Male not studied.

**Type locality:** Whitewater, Riverside Co., Cal. **Collected** September 16, 1939, by the writer. **Host:** *Larrea tridentata glutinosa* Rydb., Creosote Bush. **Relation to host:** The mites are found under the brown bud scales that persist at the petiole bases. **Type slide**, so designated, with the above data. **Paratype slides**, two in number, as above. This mite is correlated with the *spinulifera*, *haplopappi*, and *heterothecae* complex, but has a six-rayed featherclaw, and a large beak. Creosote bush is very viscid and the occurrence of these mites on this sticky plant is very remarkable.

**Eriophyes chrysopsis** Keifer, new species

## Plate 122

Female 175-190  $\mu$  long, 40-50  $\mu$  thick, light yellowish, spindleform. Rostrum 30  $\mu$  long, curved down, suboral plate spinulate. Shield 29  $\mu$  long, 34  $\mu$  wide, median  $\frac{2}{3}$  length of shield, spear-shaped; admedians complete, several submedian lines variously curved; dorsal tubercles 24  $\mu$  apart, on rear margin; dorsal setae 32  $\mu$  long, projected caudad. Forelegs 32  $\mu$  long, tibia 6.5  $\mu$  long, tarsus 8.5  $\mu$  long, claw 10  $\mu$  long, tapering, slightly knobbed, featherclaw 4 rayed. Hindlegs 27  $\mu$  long, tibia 4  $\mu$  long, tarsus 7.5  $\mu$  long, claw 10  $\mu$  long. Anterior coxae contiguous, coxae lined and somewhat spinulate. Abdomen with about 50 rings, completely microtuberculate, each tubercle bearing a spine. Lateral seta 27  $\mu$  long, on about ring 7; first ventral 54  $\mu$  long, on about ring 18; second ventral 14.5  $\mu$  long, on about ring 31; third ventral 21  $\mu$  long, on about ring 4 or 5 from rear; accessory seta present. Female genitalia 22.5  $\mu$  wide, 10  $\mu$  long, coverflap with about 8 ridges, seta 14.5  $\mu$  long.

Male 130-140  $\mu$  long, 40  $\mu$  thick.

**Type locality:** Putah Canyon, Winters, California. **Collected** November 7, 1939, by the writer. **Host:** *Chrysopsis oregana* Gray. **Relation to host:** The mites are found in the leaf axils along the stems. **Type slide**, so designated, with the above data. **Paratype slides**, three in number, as above. This is another species allied to the *spinulifera*, *heterothecae*, *haplopappi* group.

**Eriophyes caliplucheae** Keifer, new species

## Plate 123

Female 180-205  $\mu$  long, 30-35  $\mu$  thick, wormlike, light yellow. Rostrum 20  $\mu$  long, somewhat bent down. Shield 24  $\mu$  long, 24.5  $\mu$  wide, median, admedian and submedian lines clear, the sides of the disc somewhat spinulate and lateral granules bearing spinules; dorsal tubercles 18  $\mu$  apart, on rear margin; dorsal setae 15  $\mu$  long, projecting backward. Forelegs 25  $\mu$  long, tibia 4.5  $\mu$  long, tarsus 7  $\mu$  long, claw 7  $\mu$  long, tapering, featherclaw 5 rayed. Hindlegs 21  $\mu$  long, tibia 3.5  $\mu$  long, tarsus 6  $\mu$  long, claw 7.5  $\mu$  long. Sternal line simple; coxae and suboral plate spinulate. Abdomen with 50-55 rings, microtubercles bearing a spine, dorsal rings broader caudad with some ventral increase in ring number in that location. Lateral seta 12.5  $\mu$  long, on about ring 7; first ventral 29  $\mu$  long, on about ring 17; second ventral 8.5  $\mu$  long, on about ring 29; third ventral 17.5  $\mu$  long, on about

ring 4 from rear; accessory seta present. Female genitalia 16.5  $\mu$  wide, 10  $\mu$  long, coverflap with 8-10 ridges, seta 10.5  $\mu$  long.

Male not studied.

**Type locality:** Castaic, Ventura Co., California. **Collected** September 17, 1939, by the writer. **Host:** *Pluchea sericea* Nutt., Mock Willow. **Relation to host:** The mites are found principally among the leaves and in the hairs around the terminal bud. The leaves and hairs are somewhat viscid. **Type slide**, so designated, with the above data. **Paratype slides**, three in number, as above. This is a distinct species, being principally recognized by the wider posterior tergites. This character is a definite tendency toward the *Paraphytoptus* type, and indeed it may eventually be expedient to transfer this mite to that genus.

### *Paraphytoptus chrysanthemi* Keifer, new species

#### Plate 124

Female 130-150  $\mu$  long, 40  $\mu$  thick, elongate spindleform, light-yellowish. Rostrum 25  $\mu$  long, curved down. Shield 26  $\mu$  long, 31  $\mu$  wide, median line distinct, admedian and two submedian lines present, the sides granular; dorsal tubercles 22.5  $\mu$  apart, on rear margin; dorsal setae 47  $\mu$  long, projecting caudad. Forelegs 32  $\mu$  long, tibia 7.5  $\mu$  long, tarsus 7.5  $\mu$  long, claw 7.5  $\mu$  long, tapering, featherclaw 5 rayed. Hindlegs 29  $\mu$  long, tibia 6  $\mu$  long, tarsus 7  $\mu$  long, claw 8.75  $\mu$  long. Coxae somewhat lined and granular, anterior coxae touching. Abdomen with about 65-70 rings ventrally, dorsally the broader tergites begin about on ring 50 and the total is slightly less than 60. Lateral seta 20.5  $\mu$  long, on about ring 10; first ventral 55  $\mu$  long, on about ring 25; second ventral 17.5  $\mu$  long, on about ring 42; third ventral 17.5  $\mu$  long, on about ring 6 from rear; accessory seta present. Female genitalia 21.5  $\mu$  wide, 12.5  $\mu$  long, coverflap with 14-16 somewhat irregular ridges, seta 16  $\mu$  long.

Male not studied.

**Type locality:** Hanford, California. **Collected:** September 29, 1939, by L. O. Haupt. **Host:** Chrysanthemum. **Relation to host:** The mites are found around the leaf-axil buds and the terminal flowers. No damage was noted. **Type slide**, so designated, as above. **Paratype slides**, three in number, one of which bears the collection date October 25, 1939. The broad tergites in this species are developed on little more than the last abdominal third. It then is a definite link in the affinity that *Paraphytoptus* bears to *Eriophyes*.

### *Paraphytoptus brickelliae* Keifer, new species

#### Plate 125

Female 150  $\mu$  long, 45  $\mu$  thick, wormlike, light to dark amber. Rostrum 26  $\mu$  long, curved down. Shield 30  $\mu$  long, 40  $\mu$  wide, median, admedian and submedian lines very distinct, the latter forming somewhat of a network; dorsal tubercles 23.5  $\mu$  apart, on rear margin; dorsal setae 21  $\mu$  long, projecting backward. Legs spined at joints. Forelegs 33  $\mu$  long, tibia 6  $\mu$  long, tarsus 9.5  $\mu$  long, claw 8.5-9.5  $\mu$  long, tapering, slightly knobbed, featherclaw 6 rayed. Hindlegs 24  $\mu$  long, tibia 4.5  $\mu$  long, tarsus 7.5  $\mu$  long, claw 9.5  $\mu$  long. Coxae somewhat lined and in some cases slightly granular; anterior coxae touching. Abdomen with about 38 to 47 tergites, and with 50 to 60 sternites; abdomen entirely microtuberculate, the tubercles elongate dorsally and all more or less pointed, especially ventrally. Lateral seta 31  $\mu$  long, on about ring 6; first ventral 50  $\mu$  long, on about ring 16; second ventral 13.5  $\mu$  long, on about ring 28; third ventral 22  $\mu$  long, on about ring 5 from rear; accessory seta present. Female genitalia 21  $\mu$  wide, 10  $\mu$  long, coverflap with 8 to 10 ridges, seta 17.5  $\mu$  long.

Male not studied.

**Type locality:** Putah Canyon, near Winters, California. **Collected** November 7, 1939, by the writer. **Host:** *Brickellia californica* T & G Brickelbush. **Relation to host:** The mites are found among the ter-

minal buds or later among the seeds. **Type slide**, so designated, as above. **Paratype slides**, five in number, as above. *Paraphytoptus brickelliae* is the most distinct of any California species heretofore referred to this genus. The acuminate tubercles, shield pattern, and 6-rayed featherclaw indicate this.

Evidence is continually accumulating that shows *Paraphytoptus* to be a branch of *Eriophyes* which is connected by an intergrading series. The species *caliplucheae* and *chrysanthemii* are links in this series. This does not mean, however, that an arbitrary generic designation can not be used. The *Paraphytoptus* species constitute an ecological group that are very logically kept separated. The following synopsis characterizes the California species. There are three other known species, namely *paradoxus* Nal., and *septemscutatus* Nal. of Europe, and *eriophyoides* Nal. of Java. All species are found on Composites except *eriophyoides* on a Legume, and *salviacrinis* on a Labiate.

- |   |                             |   |
|---|-----------------------------|---|
| 1. Microtubercles acuminate or bearing a short spine at least on sternites, featherclaw 6-rayed; on <i>Brickellia californica</i> ----- | <i>brickelliae</i> n. sp.   | 2 |
| 1. Microtubercles not acuminate, featherclaw 5-rayed-----   |                             |   |
| 2. Tergites broadened on posterior abdominal third only; on <i>chrysanthemum</i> -----  | <i>chrysanthemii</i> n. sp. | 3 |
| 2. Tergites broadened on at least the posterior abdominal half-----   |                             |   |
| 3. Broad tergites very irregularly edged due to projection of microtubercles; on <i>Artemisia californica</i> -----                     | <i>californicus</i> Hall    | 4 |
| 3. Broad tergites comparatively smoothly edged-----   |                             |   |
| 4. Sternites doubled for almost all of abdominal length; on <i>Encelia californica</i> -----  | <i>mcgregori</i> Keifer     | 5 |
| 4. Sternites doubled conspicuously for little more than half the abdominal length-----  |                             |   |
| 5. Shield sides heavily granular past first submedian lines; on <i>Salvia apiana</i> -----  | <i>salviacrinis</i> Keifer  |   |
| 5. Shield sides more narrowly granular, second submedian lines present; on <i>Artemisia heterophylla</i> -----                          | <i>inaequalis</i> Keifer    |   |

### **Phyllocoptes scotti** Keifer, new species

#### Plate 126

Female 145-175  $\mu$  long, 50  $\mu$  wide, 45  $\mu$  thick, elongate, wormlike, light yellow. Rostrum 27.4  $\mu$  long, projecting down. Shield 37  $\mu$  long, 42  $\mu$  wide, design a network, obscure anteriorly and laterally; dorsal tubercles 23.5  $\mu$  apart, on rear margin; dorsal setae 27  $\mu$  long, projecting backward. Forelegs 29.5  $\mu$  long, tibia 6.5  $\mu$  long, tarsus 7  $\mu$  long, claw 6.5  $\mu$  long, tapering, knobbed, featherclaw 6 rayed. Hind-legs 26  $\mu$  long, tibia 4.5  $\mu$  long, tarsus 5.5  $\mu$  long, claw 6.5  $\mu$  long. Anterior coxae contiguous. Abdomen with tergites smooth or faintly microtuberculate, sternites microtuberculate; tergites about 43-50; sternites about 60-65. Lateral seta 22  $\mu$  long, on about sternite 10; first ventral 38  $\mu$  long, on about sternite 22; second ventral 17.5  $\mu$  long, on about sternite 39; third ventral 27  $\mu$  long, on about sternite 5 from rear; accessory seta present. Female genitalia 20.5  $\mu$  wide, 11.5  $\mu$  long, cover-flap with about 8 ridges, seta 30  $\mu$  long.

Male 140  $\mu$  long, 40  $\mu$  wide, 30  $\mu$  thick.

**Type locality:** Putah Canyon, Winters district, California. **Collected** November 7, 1939, by the writer. **Host:** *Cercis occidentalis* Torr., Redbud. **Relation to host:** The mites were taken from the dormant flower buds. Evidence indicates they may pass part of the summer on the leaves. **Type slide**, so designated, as above. **Paratype slides**, five in number, as above. The potentialities of this mite have not been apparent. It is found during the winter only in the large blossom buds. A number of species of *Phyllocoptes* injure flowers of various species of Leguminaceous shrubs. It is not known just how the new species is correlated with the other *Phyllocoptes* on plants of this family. I take pleasure in naming this mite for F. T. Scott of the Division of Chemistry, California Department of Agriculture, who first collected infested Redbud in Sequoia National Park, August 31, 1939.

**Phyllocoptes immigrans** Keifer, new species

## Plate 127

Female 140-190  $\mu$  long, 50-55  $\mu$  thick, amber, spindleform. Rostrum 36  $\mu$  long, prominent, projecting down. Shield 38  $\mu$  long, 41  $\mu$  wide, almost entirely smooth; dorsal tubercles 20.5  $\mu$  apart, on rear margin; dorsal setae 14  $\mu$  long, projecting up and backward. Forelegs 29  $\mu$  long, tibia 6  $\mu$  long, tarsus 7  $\mu$  long, claw 9  $\mu$  long, curved, tapering, featherclaw 7-8 rayed, usually 8. Hindlegs 26  $\mu$  long, tibia 4  $\mu$  long, tarsus 6.5  $\mu$  long, claw 9  $\mu$  long. Coxae somewhat spread, anterior coxae barely touching. Abdomen either lacking microtubercles or completely tuberculate with the tubercles bearing short spinules; about 32-35 tergites; sternites about 54. Lateral seta 38  $\mu$  long, on about sternite 6; first ventral 60  $\mu$  long, on about sternite 18; second ventral 21  $\mu$  long, on about sternite 38; third ventral 36  $\mu$  long, on about sternite 5 from rear; accessory seta present, minute. Female genitalia pushed up close to coxae, 22  $\mu$  wide, 13  $\mu$  long, coverflap smooth, obtusely pointed, seta about 50  $\mu$  long.

Male 140-180  $\mu$  long, 50  $\mu$  thick.

**Type locality:** Sacramento, California. **Collected** September 11-29, October 5-24, 1939 by the writer. **Host:** *Tamarix gallica* L. **Relation to host:** The mites are found under the scale-like leaves and wandering along the stems. **Type slide:** so designated, from *T. gallica*, October 5, 1939. **Paratype slides**, seven in number, with the above dates. No species of *Phyllocoptes* has heretofore been described from Tamarix.

**Phyllocoptes prosopis** Keifer, new species

## Plate 128

Female 160-170  $\mu$  long, 50  $\mu$  thick, spindleform, yellowish. Rostrum 29  $\mu$  long, projecting down. Shield 47  $\mu$  long, 44  $\mu$  wide, design net-like, the anterior lobe ending in a point; dorsal tubercles 30  $\mu$  apart, on rear margin; dorsal setae 25  $\mu$  long, projecting caudad. Forelegs 32  $\mu$  long, tibia 8.5  $\mu$  long, tarsus 7.5  $\mu$  long, claw 8  $\mu$  long, tapering, featherclaw 8 rayed. Hindlegs 32  $\mu$  long, tibia 7  $\mu$  long, tarsus 7.5  $\mu$  long, claw 8.5  $\mu$  long. Anterior coxae contiguous. Abdomen with tergites prominently spined, the sternites with pointed microtubercles; with 26 tergites; sternites 50-55. Lateral seta 30  $\mu$  long, on about sternite 7; first ventral 34  $\mu$  long, on about sternite 19; second ventral 28  $\mu$  long, on about sternite 34; third ventral 32  $\mu$  long, on about sternite 5 from rear; accessory seta present. Female genitalia 21.5  $\mu$  wide, 13.5  $\mu$  long, coverflap with about 12 ridges, seta 30  $\mu$  long.

Male not seen.

**Type locality:** Whitewater, Riverside County, California. **Collected** September 16, 1939, by the writer. **Host:** *Prosopis chilensis* Molina, Mesquite. **Relation to host:** The mites are vagrants on the leaves. **Type slide**, so designated, as above. **Paratype slides**, three in number, as above. This species is characterized by the tergal spines, the pointed shield and the 8-rayed featherclaw.

**Phyllocoptes aphrastus** Keifer, new species

## Plate 129

Female 150-170  $\mu$  long, 50-55  $\mu$  thick, elongate spindleform, light amber. Rostrum 22.5  $\mu$  long, projecting down. Shield 38  $\mu$  long, 45  $\mu$  wide, design obscure, practically smooth; dorsal tubercles 17.5  $\mu$  apart, a little ahead of rear margin; dorsal setae 11.5  $\mu$  long, projecting up and centrad. Forelegs 30  $\mu$  long, tibia 7.5  $\mu$  long, tarsus 6.5  $\mu$  long, claw 6  $\mu$  long, knobbed, featherclaw 4 rayed. Hindlegs 28  $\mu$  long, tibia 5.5  $\mu$  long, tarsus 6.5  $\mu$  long, claw 7.5  $\mu$  long. Coxae barely touching. Abdomen with rings lacking tubercles; slight subdorsal furrows anteriorly; tergites 45-50; sternites slightly more numerous. Lateral seta 22  $\mu$  long, on about sternite 6; first ventral 31  $\mu$  long, on about sternite 19; second ventral 15-18  $\mu$  long, on about sternite 33; third ventral 26  $\mu$  long, on about sternite 6 from rear; accessory seta present, minute. Female genitalia 20  $\mu$  wide, 10  $\mu$  long, coverflap with 10-12 ridges, seta 32  $\mu$  long.

Male not seen.

**Type locality:** Magalia, Butte County, California. **Collected** October 30, 1939, by the writer. **Host:** *Pyrus malus* L., Apple. **Relation to**

**host:** The mites are undersurface vagrants with *Calepitrimerus baileyi* K. **Type slide**, so designated, as above. **Paratype slides**, four in number, as above. This mite is another of the *Phyllocoptes* found associated with a mite of the genus *Calepitrimerus*. It is not *Phyllocoptes schlectendali* Nal., differing from that species in the direction of the shield setae, shield marking, number of tergites, lack of microtuberculate sternites, and strongly striped coverflap. To the writer's knowledge, *Phyllocoptes schlectendali* does not occur in California, at least in the central valleys.

### *Phyllocoptes fructiphilus* Keifer, new species

#### Plate 130

Female 140-170  $\mu$  long, 43  $\mu$  wide, 46  $\mu$  thick; amber to light yellow, spindle-form. Rostrum 32  $\mu$  long, rather large. Shield 40  $\mu$  long, 40  $\mu$  wide, design a network, granular laterally; dorsal tubercles 20.5  $\mu$  apart, slightly ahead of rear margin; dorsal setae 16  $\mu$  long, directed dorsocentrally. Forelegs 33  $\mu$  long, tibia 8  $\mu$  long, tarsus 8  $\mu$  long, claw 8.5  $\mu$  long, slightly knobbed, featherclaw 5 rayed. Hindlegs 29  $\mu$  long, tibia 5.5  $\mu$  long, tarsus 8  $\mu$  long, claw 10.5  $\mu$  long. Anterior coxae contiguous. Abdomen completely microtuberculate, the posterior sternites striated, the tergites and sternites subequal in number; about 55 tergites; about 60 sternites. Lateral seta 21  $\mu$  long, on about sternite 8; first ventral 46  $\mu$  long, on about sternite 20; second ventral 32  $\mu$  long, on about sternite 36; third ventral 25  $\mu$  long, on about sternite 5 from rear; accessory seta present. Female genitalia 23  $\mu$  wide, 14.5  $\mu$  long, coverflap with 6 or 7 ridges, seta 32  $\mu$  long.

Male not seen.

**Type locality:** Clarksburg, California. **Collected** December 15, 1939, by M. L. Jones. **Host:** *Rosa californica* C & S. **Relation to host:** The mites are found principally in the fruits around the seeds; also at the petiole bases. **Type slide**, so designated, as above. **Paratype slides**, four in number, as above. This appears to be the first native mite described on plants of the genus *Rosa*. It differs from *adalius* K. in the direction of the shield setae, the lack of acumination on the tubercles, and the 5-rayed featherclaw.

### *Phyllocoptes abaenus* Keifer, new species

#### Plate 131

Female 180-190  $\mu$  long, 50-55  $\mu$  thick, elongate spindleform, white to light yellow. Rostrum 23.5  $\mu$  long, projecting down. Shield 44  $\mu$  long, 48  $\mu$  wide, median and admedian lines distinct, lateral lines forming a network; dorsal tubercles 23  $\mu$  apart, a little ahead of rear margin; dorsal setae 17.5  $\mu$  long, directed upward. Forelegs 30.5  $\mu$  long, tibia 6.5  $\mu$  long, tarsus 8.5  $\mu$  long, claw 6.5  $\mu$  long, slightly knobbed, featherclaw 4 rayed. Hindlegs 29  $\mu$  long, tibia 4.5  $\mu$  long, tarsus 7.5  $\mu$  long, claw 8  $\mu$  long. Anterior coxae barely touching. Abdomen completely microtuberculate, the tergites somewhat sinuate; tergites 45-50; sternites 55-60. Lateral seta 27  $\mu$  long, on about sternite 8; first ventral 44  $\mu$  long, on about sternite 20; second ventral 19  $\mu$  long, on about sternite 36; third ventral 26  $\mu$  long, on about sternite 5 from rear; accessory seta absent. Female genitalia 28  $\mu$  wide, 16  $\mu$  long, coverflap about 3 diagonal lines, seta 20  $\mu$  long.

Male 170-180  $\mu$  long, 45  $\mu$  thick.

**Type locality:** San Mateo, California. **Collected** October 21, 1939, by the writer. **Host:** *Prunus* sp., plum. **Relation to host:** The mites are vagrants on the undersurface, most often observed in the vicinity of the midvein near the base. **Type slide**, so designated, as above. **Paratype slides**, six in number, as above. The shield setae, coxae and diagonally lined female coverflap characterize this species. It differs from *Phyllocoptes fockeui* Nal. principally in the direction of the shield setae. The mite is also known from Fairfield and Palo Alto, California, and from Okanagan Valley, B. C. It occurs in the latter location in company with *Phyllocoptes fockeui* on Italian Prune.

**Phyllocoptes dimorphus** Keifer, new species

## Plate 132

Female 150-165  $\mu$  long, 45-50  $\mu$  thick, elongate spindleform, light yellowish amber. Rostrum 26  $\mu$  long, projecting down. Shield 49  $\mu$  long, 57  $\mu$  wide; dorsal tubercles 21.5  $\mu$  apart, diagonal, near margin; dorsal setae 8.5  $\mu$  long, projecting centrad. Legs with femoral seta missing. Forelegs 42  $\mu$  long, tibia 11.5  $\mu$  long, tarsus 7  $\mu$  long, claw 5  $\mu$  long, knobbed, featherclaw 4-rayed. Hindlegs 41.5  $\mu$  long, tibia 10.5  $\mu$  long, tarsus 8  $\mu$  long, claw 5  $\mu$  long. Anterior coxae contiguous. Abdomen with tergites more or less conspicuously microtuberculate along rims, sternites strongly so; tergites about 38; sternites about 60. Lateral seta 17.5  $\mu$  long, on about sternite 9; first ventral 22  $\mu$  long, on about sternite 22; second ventral 12.5  $\mu$  long, on about sternite 39; third ventral 31  $\mu$  long, on about sternite 6 from rear; accessory seta present. Female genitalia 25  $\mu$  wide, 17  $\mu$  long, coverflap with two ranks of ridges, seta 19.5  $\mu$  long.

Male smaller, more wedge-shaped, reddish amber; body spinulate. Male 120-130  $\mu$  long, 50  $\mu$  wide, 35-40  $\mu$  thick. Male hind claw 6.5  $\mu$  long.

**Type locality:** On highway near Crest Road Camp, Arrowhead Lake district, San Bernardino County. **Collected** September 16, 1939, by the writer. **Host:** *Pteris aquilina lanuginosa* Borey, Bracken. **Relation to host:** The mites are vagrants among the frond hairs on the underside. **Type slide**, so designated, with the above data. **Paratype slides**, five in number, as above.

*Phyllocoptes dimorphus* is one of the most remarkable species of Eriophyids yet seen by the writer. As far as I know, no other described mite shows such striking sexual dimorphism. The males in this case are much smaller, more wedge-shaped, and darker in color than the females, with a longer hind claw. These males are the most active Eriophyid I have collected, traveling at a speed much greater than any other species. They are so different from the females as to give the first impression of an association of two species, and to cause speculation as to why they clustered so strongly around the larger moulting mites.

The figures are all of the female except as indicated.

**Calepitrimerus anatis** Keifer, n. sp.

## Plate 133

Female 135-150  $\mu$  long, 55-60  $\mu$  wide, 45-50  $\mu$  thick, wedge-shaped, amber color. Rostrum 23.5  $\mu$  long, projecting down. Shield 42.5  $\mu$  long, 49  $\mu$  wide, design an open network, slight lateral lobes; dorsal tubercles 17  $\mu$  apart, slightly ahead of rear margin; dorsal setae 8  $\mu$  long, projecting centrad. Forelegs 29  $\mu$  long, tibia 7  $\mu$  long, tarsus 6.5  $\mu$  long, claw 6  $\mu$  long, tapering, featherclaw 7-rayed. Hindlegs 26  $\mu$  long, tibia 6  $\mu$  long, tarsus 6  $\mu$  long, claw 8  $\mu$  long. Sternal line slightly forked. Abdomen entirely microtuberculate, with the central ridge running back about 50 tergites; tergites 65-68; sternites about 70. Lateral seta 20.5  $\mu$  long, on about sternite 11; first ventral 26  $\mu$  long, on about sternite 27; second ventral 35  $\mu$  long, on about sternite 45; third ventral 26  $\mu$  long, on about sternite 5 from rear; accessory seta present. Female genitalia 20  $\mu$  wide, 13.5  $\mu$  long, coverflap with about 10 ridges, seta 17  $\mu$  long.

Male 130  $\mu$  long, 50  $\mu$  wide, 45  $\mu$  thick.

**Type locality:** Camp Sacramento, El Dorado County, California. **Collected** September 10, 1939, by the writer. **Host:** *Amelanchier alnifolia* Nutt, Western Service Berry. **Relation to host:** The mites are vagrants on both surfaces of the leaves, perhaps favoring the underside. **Type slide**, so designated, with the above data. **Paratype slides**, three in number, as above. This species is characterized by the pattern of the shield, and by the 7-rayed featherclaw. The immature individuals apparently produce wax.

The following key covers the species of *Calepitrimerus* so far described. The first and second species are aberrant and may have

to be removed. This leaves five species which are truly congeneric with the genotype, *cariniferus*.

- |   |                             |   |
|---|-----------------------------|---|
| 1. Ventral setae I and II missing, anterior shield lobe broad and blunt; on <i>Nolina parryi</i> .....        | <i>nolinae</i> Keifer       | 2 |
| 1. Ventral setae all present, shield acute anteriorly.....  |                             | 2 |
| 2. Featherclaw divided; on <i>Hedera helix</i> .....  | <i>hederae</i> Keifer       | 3 |
| 2. Featherclaw simple.....  |                             | 3 |
| 3. Shield setae directed posteriorly; on <i>Ceanothus cordulatus</i> .....                                    | <i>phytobius</i> Keifer     | 4 |
| 3. Shield setae directed upward or anteriorly.....  |                             | 4 |
| 4. Shield setae on papilla-like tubercles, directed ahead, on <i>Umbellularia californica</i> .....           | <i>umbellulariae</i> Keifer | 5 |
| 4. Shield setae directed more upward and centrally, tubercles conical.....                                    |                             | 5 |
| 5. Featherclaw 7-rayed, shield design distinct; on <i>Amelanchier alnifolia</i> .....                         | <i>anatis</i> n. sp.        | 6 |
| 5. Featherclaw 4-rayed, shield pattern indistinct.....  |                             | 6 |
| 6. Central ridge about two-thirds abdominal length, 45 to 50 tergites; on <i>Artemisia heterophylla</i> ..... | <i>cariniferus</i> Keifer   |   |
| 6. Central ridge about half abdominal length, 65-70 tergites; on apple.....                                   | <i>baileyi</i> Keifer       |   |

### "Epitrimerus" *adornatus* Keifer, new species

#### Plate 134

Female 180-225  $\mu$  long, 55-65  $\mu$  thick, robust spindleform, dull deep purple, the shield lines and five abdominal ridges lined with contrasting white wax. Rostrum 52  $\mu$  long, large and curved down. Shield 60  $\mu$  long, 65  $\mu$  wide, admedian lines curved to form a central longitudinal 8-shaped figure, two lateral lines form a design of cells; dorsal tubercles apparently present but rudimentary, 35  $\mu$  apart, ahead of rear margin; dorsal setae missing. Forelegs 43  $\mu$  long, tibia 11.5  $\mu$  long, tarsus 9  $\mu$  long, claw 8  $\mu$  long, with large knob, featherclaw 5-rayed. Hindlegs 38  $\mu$  long, lacking patellar seta, tibia 85  $\mu$  long, tarsus 8  $\mu$  long, claw 7.5  $\mu$  long. Anterior coxae approximate, setae II laterally directed. Abdomen with four tergal longitudinal furrows, separated by three dorsal ridges and a lateral ridge, about 70 tergites; sternites 75-80. Lateral seta 30  $\mu$  long, on about sternite 10; first ventral 45  $\mu$  long, on about sternite 29; second ventral 27  $\mu$  long, on about sternite 53; third ventral 30  $\mu$  long, on about sternite 7 from rear; accessory seta absent. Female genitalia 35  $\mu$  wide, 20  $\mu$  long, coverflap with faint lines, seta 16  $\mu$  long.

Male not studied.

**Type locality:** Sacramento, California. **Collected** September 29, October 2 and 3, 1939, by the writer. **Host:** *Viburnum opulus* L. **Relation to host:** The mites are vagrants on both surfaces of the leaves, causing little or no injury, but leaving the conspicuous white cast skin streaks. **Type slide**, so designated, collected on October 3. **Paratype slides**, five in number, as above. This mite is striking in appearance. The white waxy ridges contrast strongly with the dark purple body. This species suggests a relationship with *Callyntrotus schlectendali* Nal., but that mite has lines of wax-bearing tubercles and not ridges. The absence of dorsal setae, as in *Diptilomiopus*, is not correlated with produced genitalia and shortened anterior apodeme.

### *Oxypleurites glabratae* Keifer, new species

#### Plate 135

Female 150-160  $\mu$  long, 55  $\mu$  wide, 40  $\mu$  thick, flattened, wedge-shaped in dorsal view, light amber. Rostrum 23  $\mu$  long, projecting down. Shield 52  $\mu$  long, 55  $\mu$  wide, the surface without design, front lobe rather blunt in dorsal view, the sides broad and rounded; dorsal tubercles 26  $\mu$  apart, on rear margin; dorsal setae 8.5  $\mu$  long, projecting upward and centrally. Forelegs 31  $\mu$  long, tibia 7.5  $\mu$  long, tarsus 5.75  $\mu$  long, claw 5.75  $\mu$  long, knobbed, featherclaw 4-rayed. Hindlegs 31  $\mu$  long, tibia 5.5  $\mu$  long, tarsus 6  $\mu$  long, claw 7  $\mu$  long. Anterior coxae contiguous. Abdomen with tergites smooth and not formed into a middorsal ridge; 20 tergites; sternites about 65. Lateral seta 23  $\mu$  long, on about sternite 11; first ventral 40  $\mu$  long, on about sternite 23; second ventral 14.5  $\mu$  long, on about sternite 41; third ventral 20  $\mu$  long, on about sternite 4 from rear; accessory setae absent. Female genitalia 20.5  $\mu$  wide, 14.5  $\mu$  long, coverflap with 12 to 14 ridges, seta 32  $\mu$  long.

Male noticeably narrower than female. Male 130-140  $\mu$  long, 50  $\mu$  wide, 35  $\mu$  thick.

**Type locality:** Putah Canyon near Winters, California. **Collected** September 4, 1939, by the writer. **Host:** *Cornus glabrata* Benth.

**Relation to host:** The mites occur on both leaf surfaces, causing some browning, and leaving numerous white waxy streaks. **Type slide**, so designated, with the above data. **Paratype slides:** three in number as above. The immature stages of this species have three dorsal waxy ridges, hence the white streaks on the leaf surface. This mite is very close to *cornifoliae* K, but is more blunt anteriorly. It may be distinguished from other *Oxypleurites* species now found in California as follows:

- |  |                            |
|--|----------------------------|
| 1. Dorsal tubercles distinctly ahead of rear shield margin, claw knob elongate----   | 2                          |
| 1. Dorsal tubercles on or near rear shield margin, claw knob round-----  | 3                          |
| 2. Shield blunt anteriorly in dorsal view, coverflap striations in two ranks; on <i>Ainus rubra</i> -----                        | <i>marinalis</i> Keifer    |
| 2. Shield acute anteriorly in dorsal view, coverflap striations in one row; on <i>Corylus avellana</i> -----                     | <i>depressus</i> Nal.      |
| 3. Dorsal setae projecting directly caudad, a middorsal ridge-----   | 4                          |
| 3. Dorsal setae projecting upward and toward center-----   | 6                          |
| 4. Accessory seta absent, part of tergites projecting farther laterally than others; on olive-----                               | <i>maxwelli</i> Keifer     |
| 4. Accessory seta present, tergites even laterally-----  | 5                          |
| 5. Tergites distinctly striate along middorsal ridge; on <i>Baccharis emoryi</i> -----   | <i>baccharis</i> Keifer    |
| 5. Tergites but slightly roughened along middorsal ridge, on <i>Baccharis pilularis</i> -----                                    | <i>acidotus</i> Keifer     |
| 6. Abdomen with a distinct middorsal ridge; on <i>Aesculus californicus</i> -----  | <i>neocarيناتus</i> Keifer |
| 6. Abdomen without a middorsal ridge-----  | 7                          |
| 7. Anterior lobe of shield rather acute in dorsal view, shield sides oblique; on <i>Cornus californicus</i> -----                | <i>cornifoliae</i> Keifer  |
| 7. Anterior lobe rounded in dorsal view, shield broad, and rounded on edges behind frontal lobe; on <i>Cornus glabrata</i> ----- | <i>glabratae</i> n. sp.    |

### DESIGNATIONS ON PLATES

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- API** Interior structures of female genitalia  
**D** Dorsal diagram of mite  
**DA** Dorsal view of anterior end  
**ES** Detail of side skin  
**F** Featherclaw  
**F1** Featherclaw and adjacent tarsal structures from below  
**GF1** Female genitalia and coxae  
**L** Left legs or parts of left legs  
**L1** Left front leg  
**LM** Part of left male leg, in this case the male hind tarsus  
**S** Side diagram of mite  
**SA** Side view of anterior end

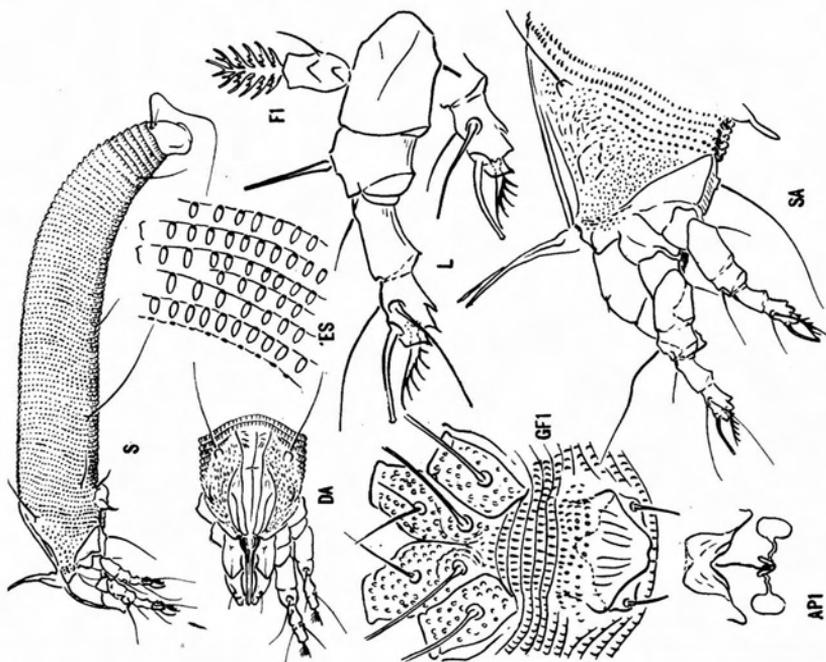


PLATE 115. *Eriophyes necessigi* K., n. sp.

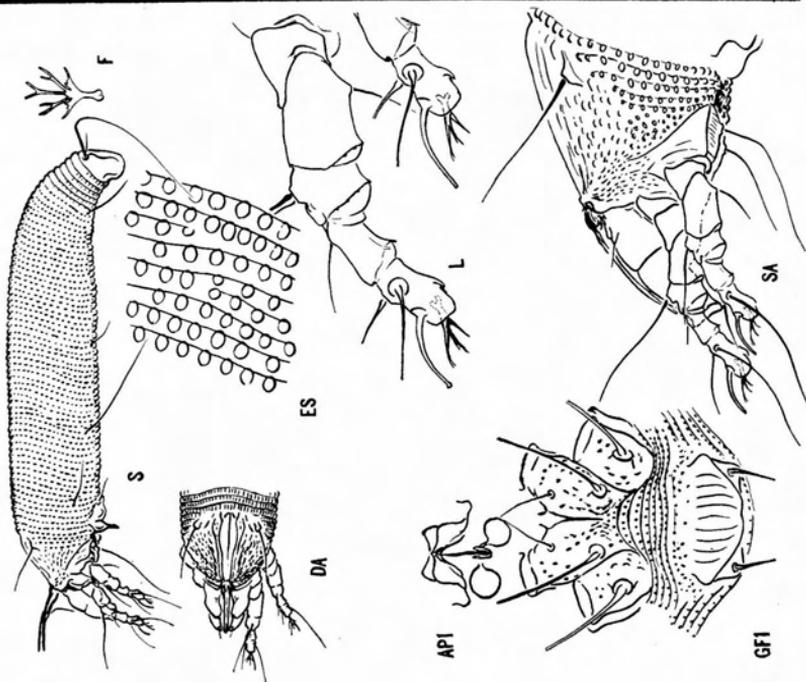


PLATE 114. *Eriophyes trivadiatus* Nal.

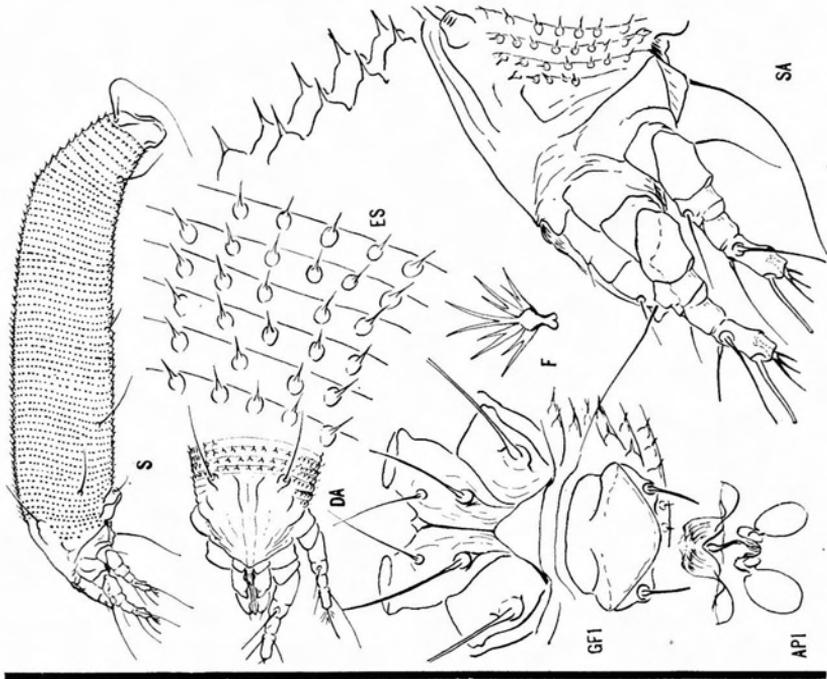


PLATE 117. *Eriophyes amicus* K., n. sp.

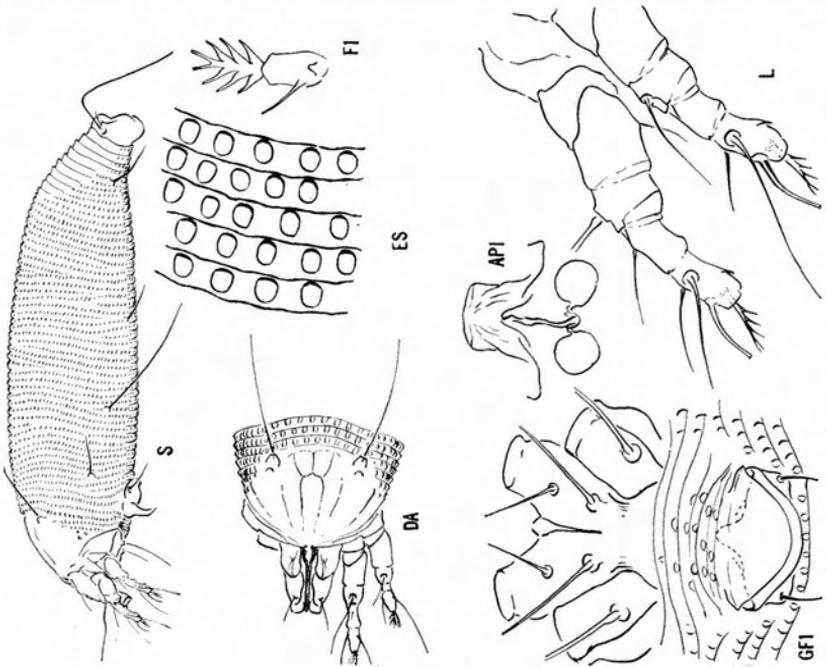


PLATE 116. *Eriophyes parapopuli* K., n. sp.

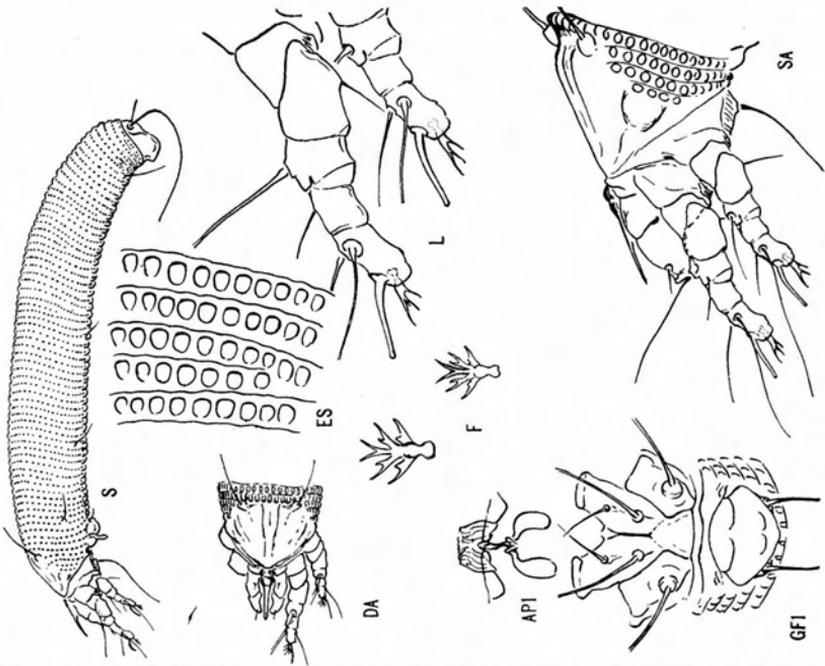


PLATE 119. *Eriophyes caulis* Cook

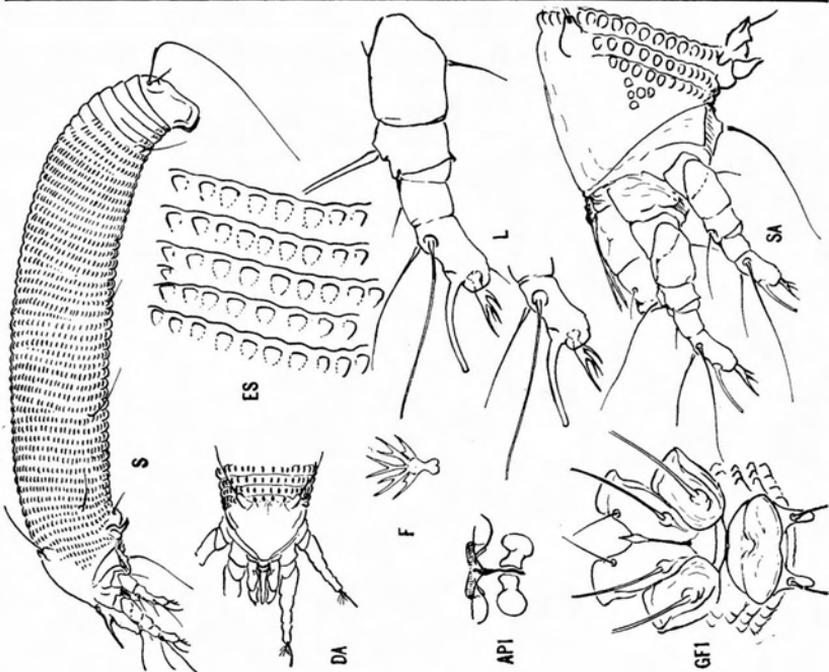


PLATE 118. *Eriophyes cinereae* K., n. sp.

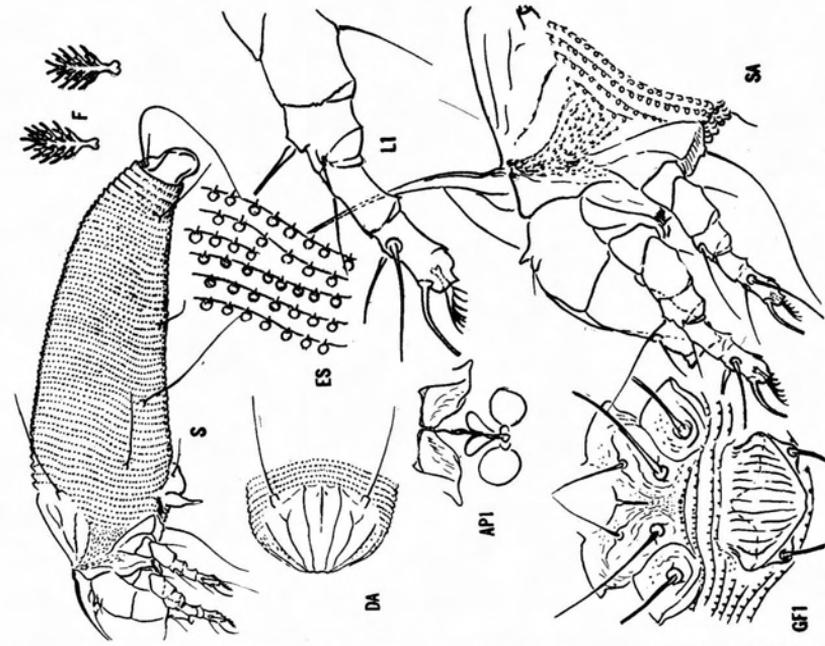


PLATE 121. *Eriophyes larreae* K., n. sp.

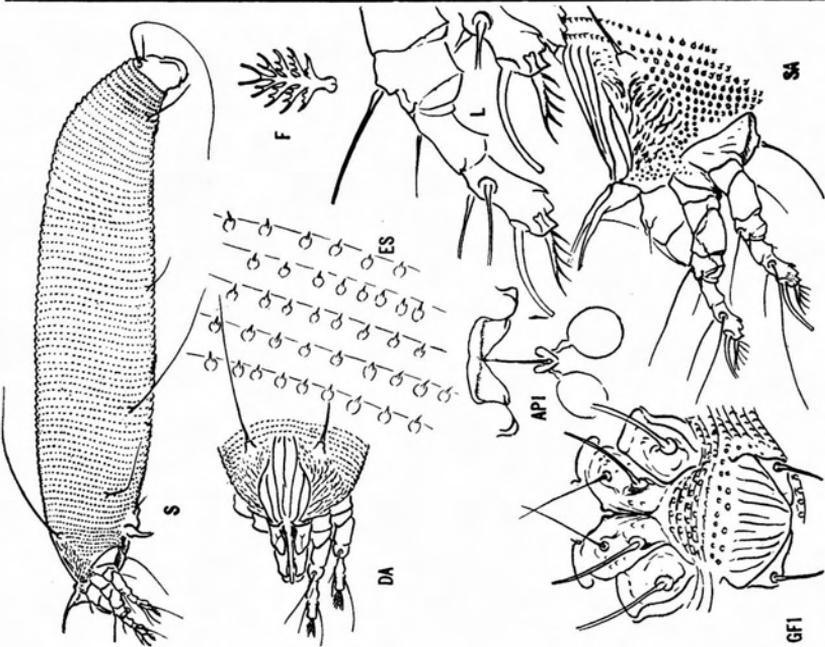


PLATE 120. *Eriophyes abalis* K., n. sp.

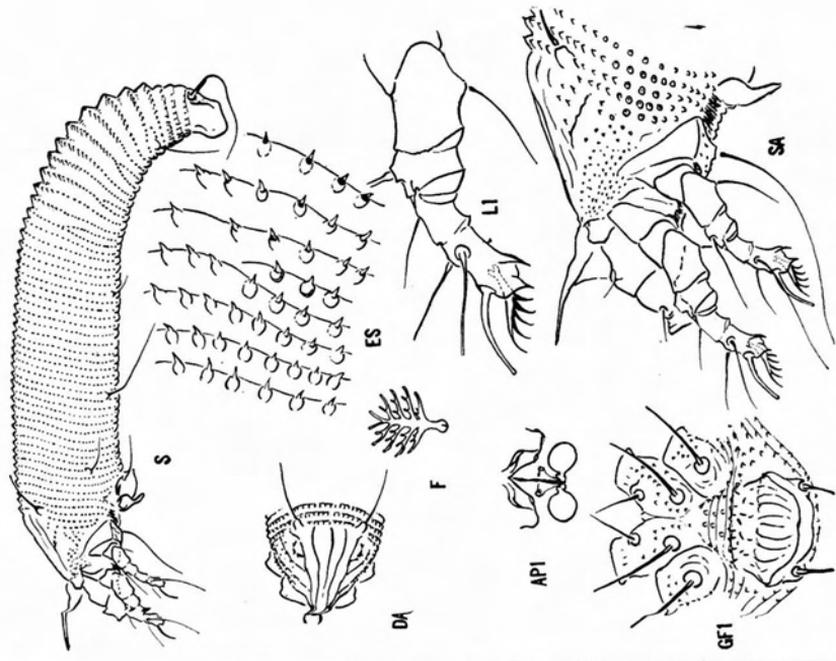


PLATE 123. *Eriophyes caliplucheae* K., n. sp.

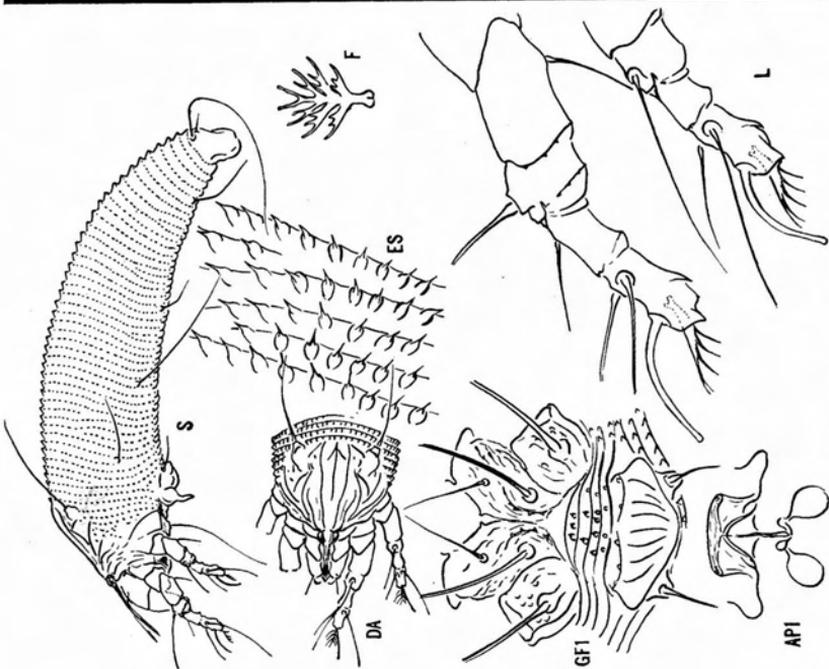


PLATE 122. *Eriophyes chrysopsis* K., n. sp.

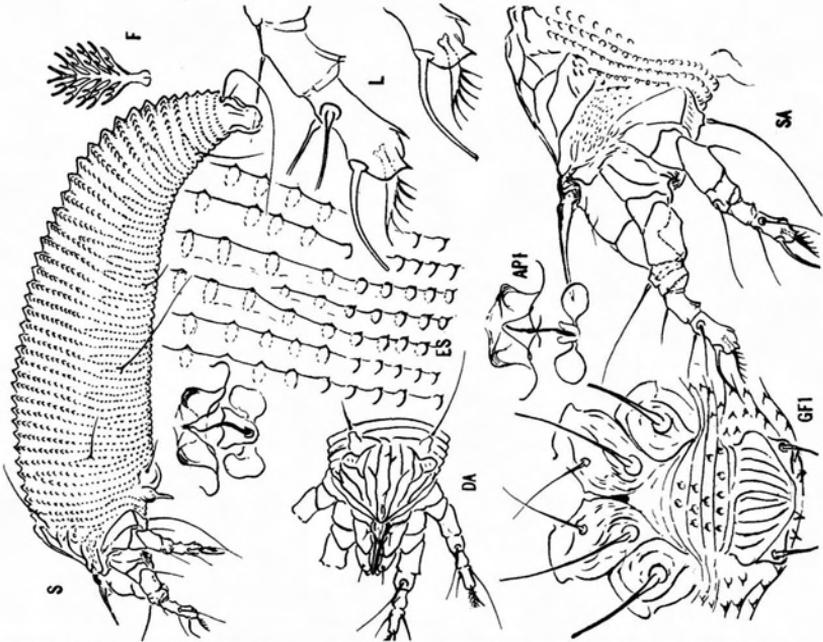


PLATE 125. *Paraphytoptus brickelliae* K., n. sp.

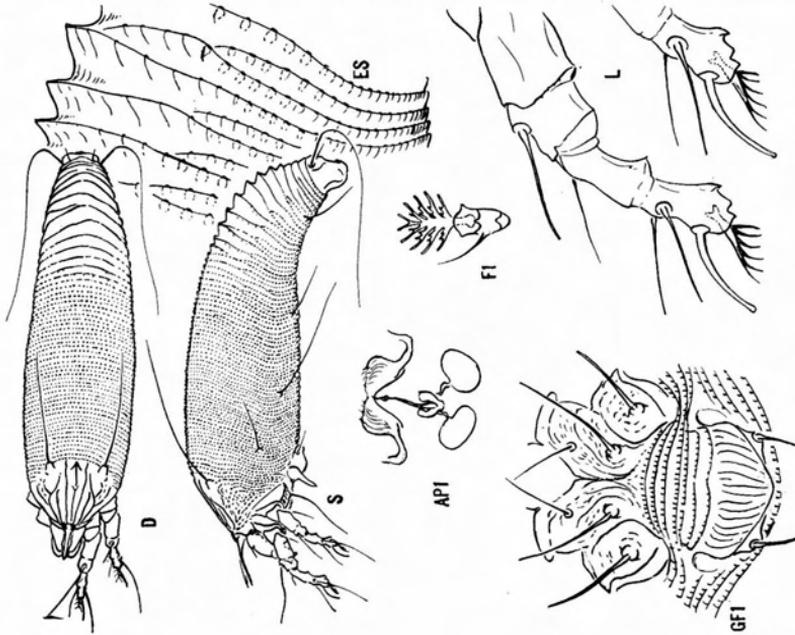


PLATE 124. *Paraphytoptus chrysanthemi* K., n. sp.

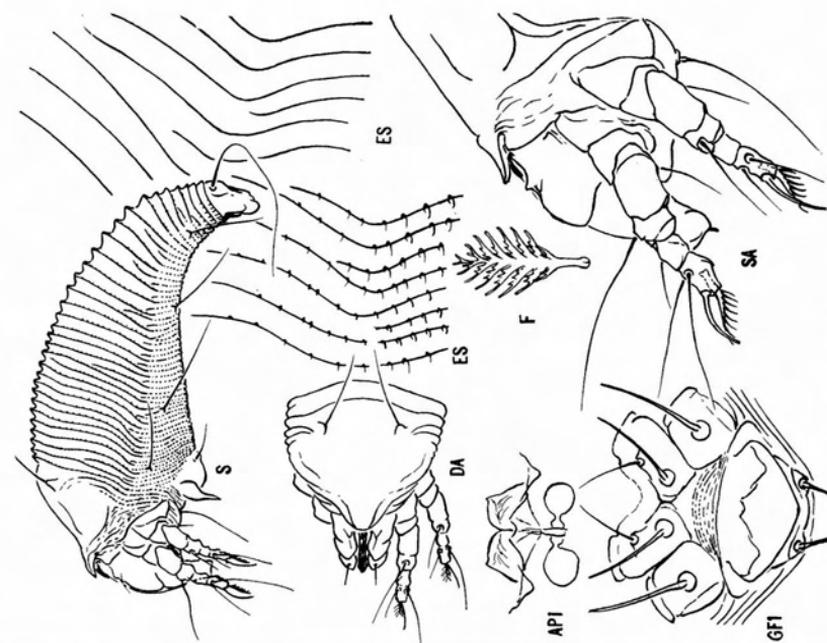


PLATE 127. *Phyllocoptes immigrans* K., n. sp.

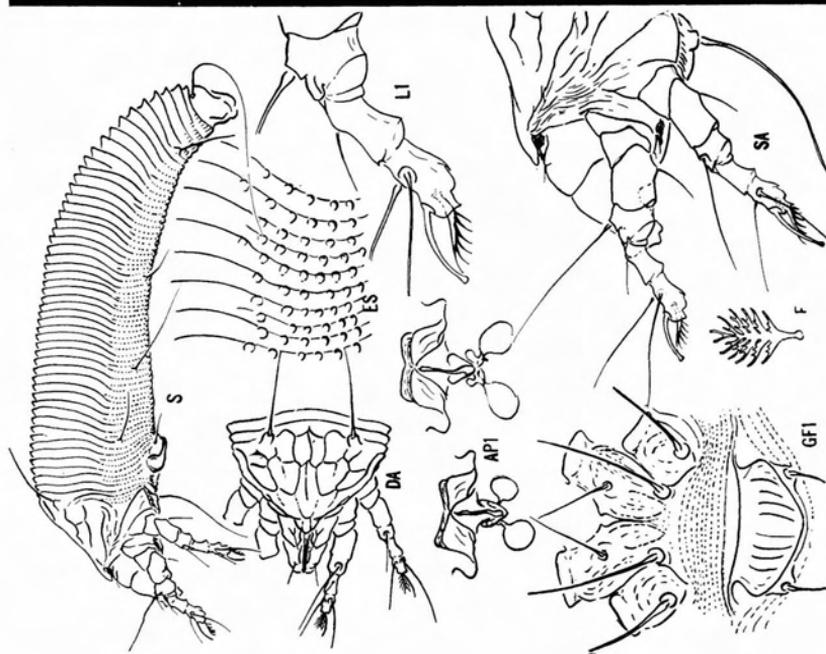


PLATE 126. *Phyllocoptes scotti* K., n. sp.

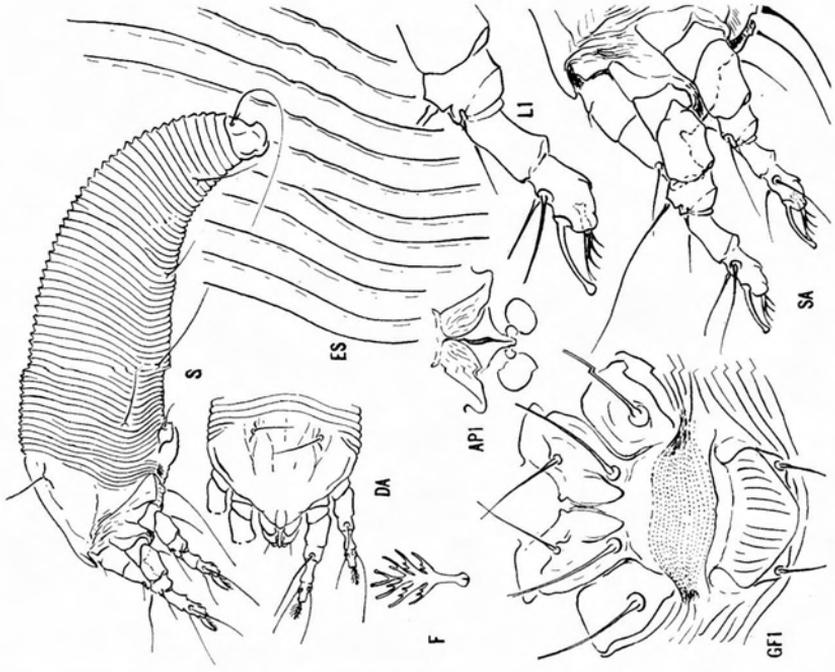


PLATE 129. *Phyllocoptes aphrastus* K., n. sp.

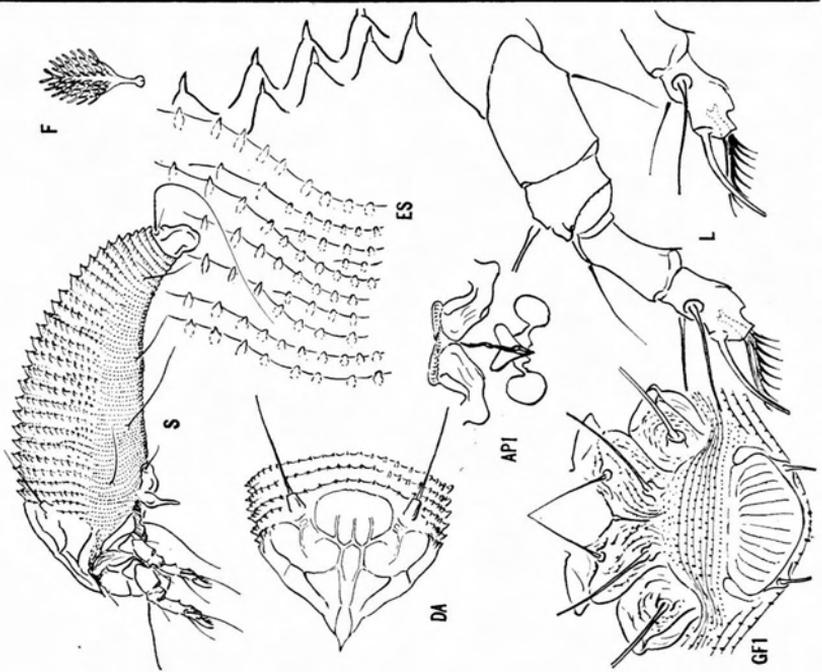


PLATE 128. *Phyllocoptes prosopis* K., n. sp.

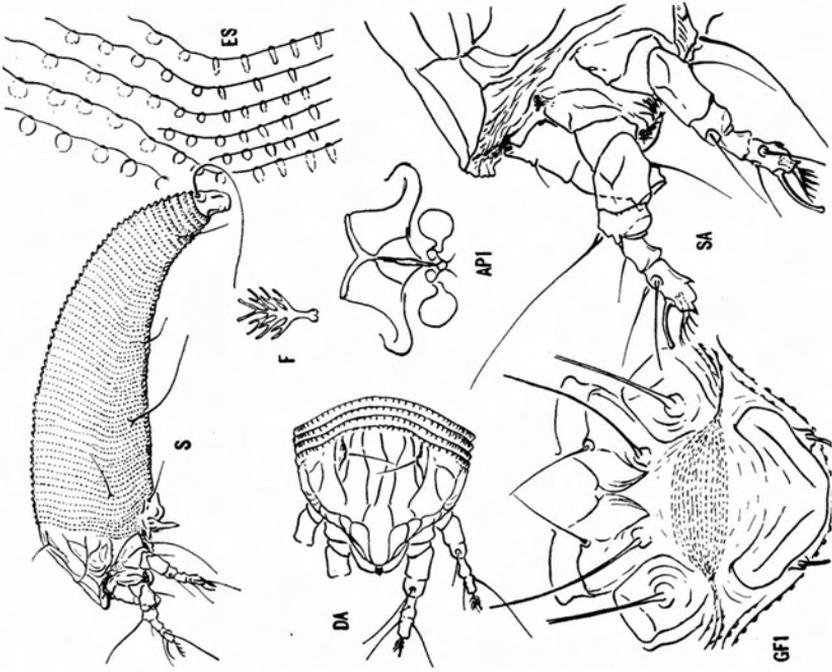


PLATE 131. *Phyllocoptes abaeus* K., n. sp.

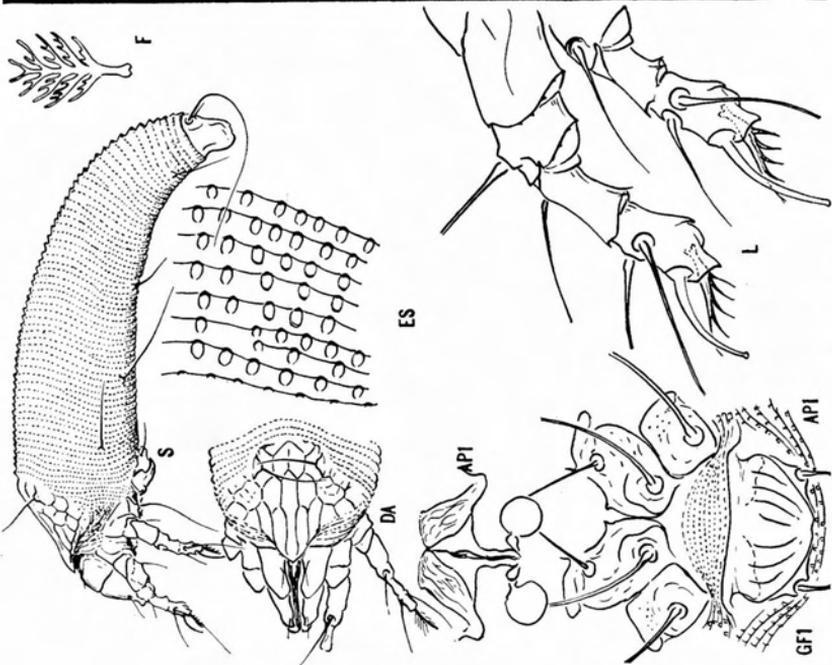


PLATE 130. *Phyllocoptes fructiphilus* K., n. sp.

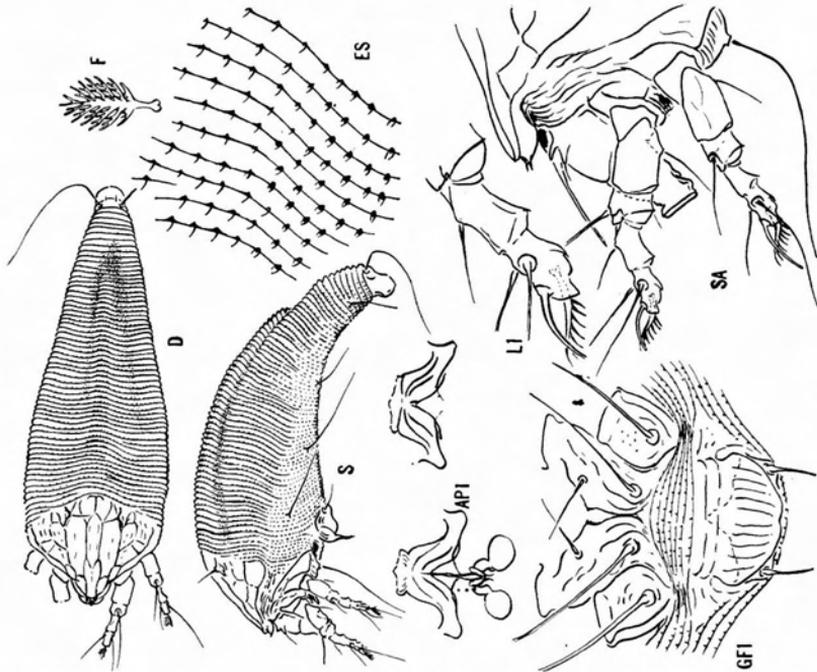


PLATE 133. *Calepitrimerus anatis* K., n. sp.

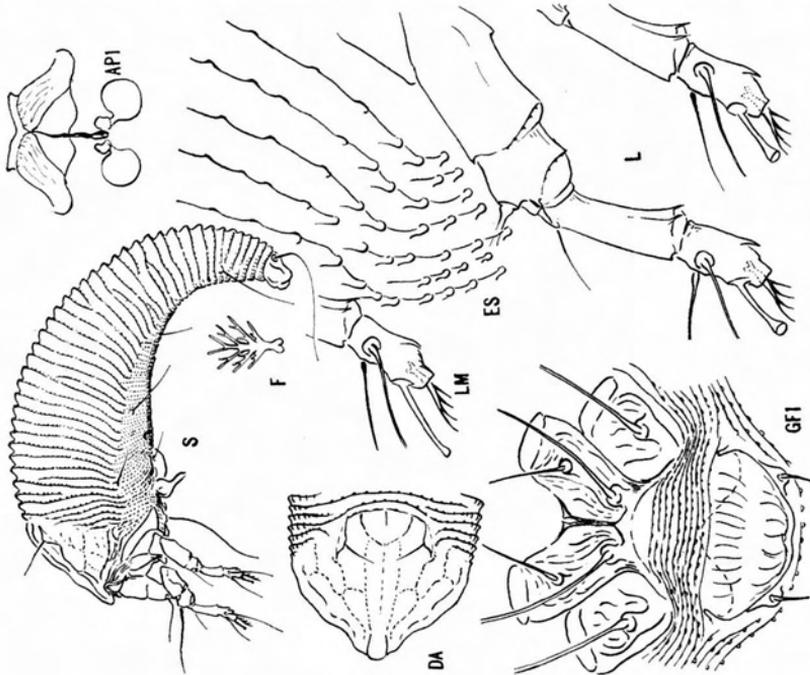


PLATE 132. *Phyllocoptes dimorphus* K., n. sp.

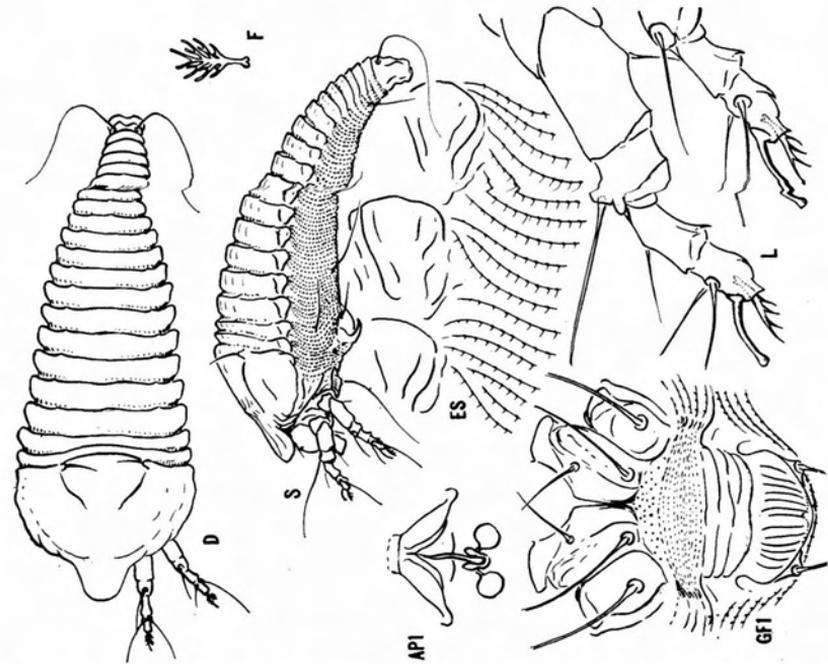


PLATE 135. *Orpipleurites glabratae* K., n. sp.

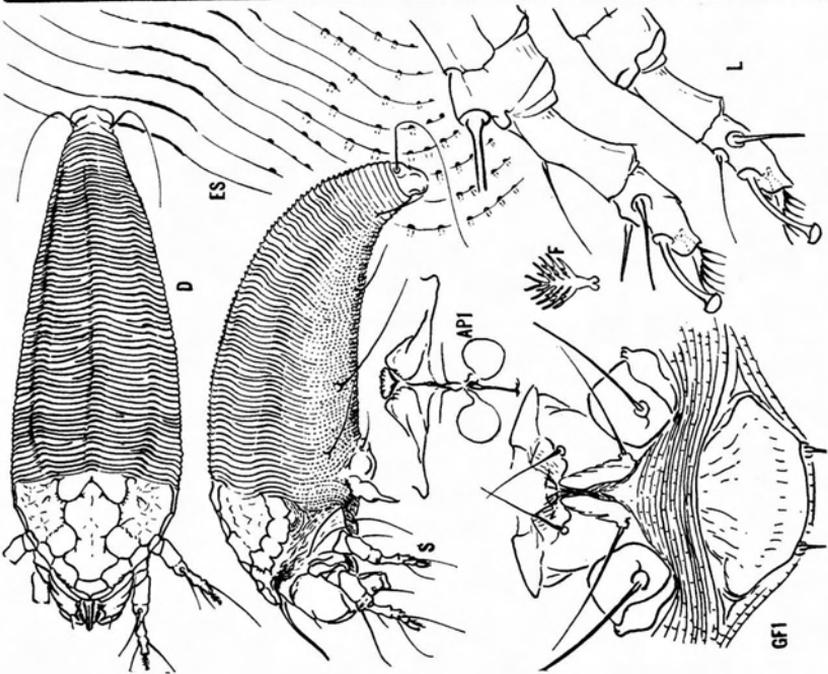


PLATE 134. "*Epitrimerus*" *adornatus* K., n. sp.

## HOST LIST

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### Polypodiaceae

- Pteris aquilina lanuginosa* Borey. Bracken  
*Phyllocoptes dimorphus* n. sp., among underside hairs

### Salicaceae

- Salix hindisiana* Benth. Sandbar Willow  
*Eriophyes triradiatus* Nal. in hairs around terminal bud  
*Populus* sp.  
*Eriophyes neoessigi* n. sp., deformation of female catkins  
*Populus* sp.  
*Eriophyes parapopuli* n. sp., woody galls around buds

### Juglandaceae

- Juglans californica* Wats. California Black Walnut  
*Eriophyes amiculum* n. sp., inquilin in leaf galls  
*Juglans hindsii* Jepson  
*Eriophyes amiculum* n. sp.  
*Juglans cinerea* L. Butternut  
*Eriophyes cinereae* n. sp., leaf erineum  
*Juglans nigra* L. Black Walnut  
*Eriophyes caulis* Cook, petiole swellings

### Rosaceae

- Rosa californica* C & S  
*Phyllocoptes fructiphilus* n. sp. in fruits among seeds  
*Pyrus malus* L. Apple  
*Phyllocoptes aphrastus* n. sp., undersurface vagrant  
*Amelanchier alnifolia* Nutt. Service Berry  
*Calepitrimerus anatis* n. sp., vagrant on leaves  
*Prunus* spp., plum, prune  
*Phyllocoptes abaenus* n. sp., vagrant

### Leguminosae

- Cercis occidentalis* Torr., Redbud  
*Phyllocoptes scottii* n. sp., in flower buds  
*Prosopis chilensis* Molina, Mesquite  
*Phyllocoptes prosopis*, n. sp., on leaves

### Zygophyllaceae

- Larrea tridentata glutinosa* Rydb., Creosote Bush  
*Eriophyes larreae* n. sp., under scales at petiole base (stipules?)

### Tamaricaceae

- Tamarix gallica* L.  
*Phyllocoptes immigrans* n. sp., under scale-like leaves

### Cornaceae

- Cornus glabrata* Benth.  
*Oxypleurites glabratae* n. sp., vagrant on leaves

### Caprifoliaceae

- Viburnum opulus* L.  
*"Epitrimerus" adornatus* n. sp., vagrant on leaves

### Compositae

- Brickellia californica* T & G., Brickel Bush  
*Paraphyoptus brickelliae* n. sp., in terminals or among seeds  
*Chrysopsis oregana* Gray  
*Eriophyes chrysopsis* n. sp., in leaf axils  
*Pluchea sericea* Nutt., Mock Willow  
*Eriophyes calipluchae* n. sp., in leaf axils and among terminal leaves  
*Chrysanthemum "hortorum"*  
*Paraphyoptus chrysanthemi* n. sp., in leaf axils  
*Artemisia heterophylla* Nutt.  
*Eriophyes abalis* n. sp., hairy leaf pockets